

REMARKS

Claims 14-22 are pending in the present application. Claims 1-6 and 10-13 are cancelled. Claim 14 is herein amended. Claims 21 and 22 have been newly added. No new matter has been presented.

Claim 14 has been amended to recite a method of extracting ions from a linear ion trap “to time-of-flight mass spectrometer.” Support for this amendment is in the specification (Application Publication 2008/0035842) at paragraphs 38-39 and Figs. 4 and 5.

Claim 14 has been amended to include “extracting the trapped ions in said ion trap to said time-of-flight mass spectrometer by applying extracting levels on the electrodes of said ion trap under conditions where said discrete DC levels applied on the electrode are kept constant until all the trapped ions are extracted.” Support for this amendment is in the specification at paragraph 11, lines 3-10; paragraph 12, lines 12-24; paragraph 42, lines 15-17; paragraph 41; and Fig. 7.

New claims 21 and 22 recite the features of cancelled claims 11 and 12, respectively.

Claim Rejections - 35 U.S.C. § 102

Claims 14-18 were rejected under 35 U.S.C. § 102(b) as being anticipated by **Ding** (US 6,900,433). Favorable reconsideration is requested.

(1) Applicants respectfully submit that Ding does not teach or suggest “A method of extracting ions from a linear ion trap to time-of-flight mass spectrometer” as recited in amended claim 14.

Claim 14 recites a method of extracting ions from a linear ion trap to time-of-flight mass spectrometer. That is, the method of claim 14 is used in the apparatus comprising the linear ion trap and the time-of-flight mass spectrometer. The apparatus of Ding does not involve time-of-flight mass spectrometer because the invention of Ding relates to a method of using a quadrupole ion trap as a mass spectrometer.

The objects of the invention of claim 14 and Ding are inherently different because they use different apparatuses. The object of claim 14 is to improve the performance of TOF mass analysis in terms of resolution and mass accuracy by eliminating the energy spread of the trapped ions in the ion trap before ejecting to the TOF mass spectrometer. (Paragraph 3.)

As described above, the invention of Ding relates to a method of using a quadrupole ion trap as a mass spectrometer. Therefore, Ding need not consider the energy spread of the ions in the ion trap before ejecting from the ion trap. The objective of Ding is to improve the performance of mass scanning of the ion trap.

(2) Applicants respectfully submit that Ding does not teach or suggest:

extracting the trapped ions in said ion trap to said time-of-flight mass spectrometer by applying extracting levels on the electrodes of said ion trap under conditions, where said discrete DC levels applied on the electrode are kept constant, until all the trapped ions are extracted

as recited in amended claim 14.

Claim 14 recites applying the extracting voltage levels applied on the electrodes of the ion trap (see Fig. 7) until all the trapped ions are extracted. Ding varies the duty cycle of every

n-th wave of the rectangular wave voltage (where n is an integer greater than 1) to cause ejection of ions. (Abstract.)

The extracting step of claim 14 is performed in conditions where the discrete DC levels applied on the electrodes are kept constant, creating a constant electrostatic field in the ion trap (see Fig. 6 showing the period of the waveform is changed from 1 μ s to 10 μ s). That is, the extracting levels are applied after the field in the ion trap becomes constant. A constant field in the ion trap prior to applying the extracting levels in the ion trap is important for optimizing the resolution and mass accuracy of the TOF mass analysis. For example, the distribution of the ion positions and velocities (paragraph 43), and the minimized velocity spreads of the ions prior to ejection (paragraph 44). Therefore, the invention of claim 14 can improve the performance of TOF mass analysis.

Although Ding states that “there are many variations of the geometrical construction of a quadrupole ion trap. For example, the ion trap can be built to generate, as precisely as possible, the pure quadrupole electric field,” (col. 5, lines 19-22), the “pure quadrupole electric field” seems not to be intended to make the optimum conditions of ion ejection out of the trap. It is because Ding does not have the object of improving the performance of TOF mass analysis.

For at least the foregoing reasons, claim 14 is patentable over the cited references, and claims 15-18, 21 and 22 are patentable by virtue of their dependence from claim 14. Accordingly, withdrawal of the rejection of claims 14-18 is hereby solicited.

Amendment under 37 C.F.R. §1.111
Attorney Docket No. 062918
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In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
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